ANNUAL REPORT 1964

FORT WILLIAM

water pollution control plant

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Fort William Local Advisory Committee,
City of Fort William.

Gentlemen:

We are pleased to provide you with the 1964 Operating Report for the Fort William Water Pollution Control Plant, OWRC Projects Nos. 60-S-50 and 61-S-91.

By continuing the mutual cooperation which has existed in the past, we can look forward to greater progress in the field of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Fort William Water Pollution Control Plant, OWRC Projects Nos. 60-S-50 and 61-S-91.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B C Palmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report describes the operation of this project for the year 1964. It includes a detailed description of the project, summary of operation, graphs and charts showing quality and quantity information, and project cost data.

This information will be of value to the municipality in assessing the adequacy of the works in meeting existing requirements and in projecting its capability to meet future expected demands. The cost information will be of particular interest to those concerned with developing and maintaining revenue structures.

The preparation of this report has been a cooperative effort of several groups within the Division of Plant Operations. These include the Statistical Section, Brochures Officer and the Regional Supervisor. However, the primary responsibility for the content has been with the Regional Operations Engineer. He will be pleased to discuss all aspects of this report with the municipality.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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FORT WILLIAM

water pollution control plant

operated for

THE CITY OF FORT WILLIAM

by the

ONTARIO WATER RESOURCES COMMISSION

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L. E. Owers

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W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: D. A. McTavish
Operations Engineer: M. B. Fielding

801 Bay Street **Toronto 5**

'64 REVIEW

The flow to the Fort William Water Pollution Control Plant averaged 2.15 mgd (million gallons per day) since start-up. This is considerably less than the design flow of 6.0 mgd. Design flow was reached only 1.6% of the time.

The cost of operation in 1964 was $30,424.60 representing a per capita cost of $0.66, based on a population of 46,667 persons or a cost of $37.11 per million gallons of sewage treated.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY
1956 – 1964

INCEPTION

In September, 1956, the City of Fort William requested the Ontario Water Resources Commission to finance, construct and operate water pollution control facilities in the municipality. The firm of W. L. Wardrop and Associates Limited was engaged to prepare plans and specifications for the project.

APPROVAL

Ontario Municipal Board approval for the project was granted in November, 1959. An agreement with the Ontario Water Resources Commission to finance, construct and operate the works was subsequently executed.

CONSTRUCTION

McNamara Construction Company of Ontario Limited, Leaside, Ontario, completed construction of the interceptor sewers in October, 1962. Hacquoil Construction Limited completed the construction of the influent and outfall sewers in August, 1963. Schwenger Construction Limited, Burlington, Ontario, completed construction of the plant in March, 1964.

TOTAL COST

The total cost was $3,623,769.31.

A. T. ROBSON
CHIEF OPERATOR

Mechanic - E. E. Blanshard

Operators
W. K. Corbett L. G. Martin
L. A. McNaughton

Groundsman - R. E. Phillips

Project Staff

COMMENTS

Mr. Robson has been the Chief Operator since the beginning of operation in 1964. He has successfully completed the Basic Sewage Works Operators Course. It is anticipated that he will complete the Intermediate and Senior courses by the end of 1966.

Description of Project

PRE-SEDIMENTATION

The city sewer system delivers waste water to the plant where it enters through the screen room. In this room, self-cleaning screens remove any large objects which may infiltrate the sewer system.

The waste water flows from the screen room into a wet well, which is primarily a pump suction chamber, from where main pumps raise the waste water and discharge it into a channel leading to the grit tank. From this channel the flow throughout the remainder of the plant is by gravity.

SEDIMENTATION OF INORGANICS

In the grit tank the velocity of flow is reduced sufficiently to allow the heavier particles of grit and sand to settle out. Air is blown into the tank to keep the organic solids in suspension. A clam-shell bucket hoist is used to periodically remove the accumulated sand and grit which is trucked away to a disposal area. Following this initial settling, the flow then passes through another channel into the settling tanks. This channel contains a flume which measures the flow passing through the plant.

SEDIMENTATION OF ORGANICS

The waste water enters one of the two settling tanks and undergoes a detention period of approximately two hours to allow the heavier solids (sludge) to settle to the bottom of the tanks for removal.

The tanks are equipped with submerged sludge removal and floating scum removal mechanisms. The sludge is periodically drawn off from the bottom of the tanks and, with surface scum material, is pumped to the digesters for treatment.

The treated waste water (effluent) flows over the effluent weirs of the tanks into another channel which discharges it to an outfall chamber.

CHLORINATION

Chlorine is added through the influent wet well for odour control, and to the effluent discharge for bacterial reduction. The outfall chamber and sewer double as a chlorine contact chamber to effect chlorination of the effluent.

The outfall sewer discharges into the Kam River.

SLUDGE TREATMENT

The sludge removed from the settling tanks is treated in two stages called primary and secondary digestion.

The sludge from the settling tanks is pumped to the primary digester. In the absence of air, and at a regulated temperature of 90° F., the decomposing or digestion process takes place. The sludge is broken down by anaerobic bacterial action and, when thoroughly digested, it is a thick, black, odourless liquid. Constant agitation within this tank ensures overall treatment.

The secondary digester receives the digested material from the primary stage and completes the process. The secondary digester is not agitated but is allowed to be quiescent. The supernatant is decanted and returned to the flow. Sludge gas (principally methane) which is formed during the process is used as a fuel for the heat exchangers and boilers supplying heat to the digesters and buildings. The standby fuel is natural gas.

SLUDGE REMOVAL

The digested sludge is removed by tank truck for final disposal.

Design–Data

GENERAL

Type of Plant - Primary treatment with two stage digestion.

Design Population - 48,000

Design Plant Flow - 6 mgd

Per Capita Flow - 125 gpd

PRIMARY TREATMENT

Grit Removal

Aerated grit chamber

Size 29' x 25' x 15' deep

Detention Time - 1.5 minutes at 6.0 mgd

Sewage Lift Pumps

Sizes - two 7.4 mgd infinitely variable from 3.0 - 7.4 mgd.

- two 4.3 mgd infinitely variable from 1.2 - 4.3 mgd.

Flow matcher, liquid rheostat with wound rotor motors.

Primary Sedimentation Tanks

Type - 2 rectangular parallel units

Size - 132' x 37' x 8' deep

Retention - 2.5 hours

Surface Settling Rate - 600 gallons per sq. ft. per day.

Overflow Rate - 10,000 gallons per ft. of weir per day.

Digesters

Size - 2 digesters 60 ft. in diameter

Capacity - 71,000 cu. ft. each

Loading - 1.5 lbs. of solids per cubic ft. per month

Outfall

Size - 42 inch diameter reinforced concrete pipe discharging into the Kam River.

PROJECT COSTS

LONG TERM DEBT:	(60-S-50)	$480,719.00
(Total Capital Cost)	(61-S-91)	$868,800.00

The total cost to the municipality during 1964 was as follows:

Net Operating	$ 30,424.60
Debt Retirement	9,701.00
Reserve	10,033.00
Interest Charged	27,653.57
	$ 77,812.17
Less CR. (61-S-91)	45,122.35
TOTAL	$ 32,689.82

RESERVE ACCOUNT

Balance at January 1, 1964	$ 10,243.32
Deposited by municipality	10,033.00
Interest Earned	774.26
	$ 21,050.58
Less Expenditures	-
Balance at December 1, 1964	$ 21,050.58

MONTHLY COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	27.91									27.91	
FEB	14.48									14.48	
MARCH	82.76	80.76								2.00	
APRIL	868.64	574.93		277.93			6.08			9.70	
MAY	3391.43	2480.25		204.58	331.59	85.55	274.56			14.90	
JUNE	7218.57	1826.50		311.10	389.43	4159.40	274.21	248.23		9.70	
JULY	6708.66	1653.50	212.40	195.40	654.03	3709.40	130.82	102.41		10.20	40.50
AUG	1340.66	1653.50	219.12	99.60	531.64	(1350.00)	130.39			56.41	
SEPT	4697.30	1816.20	270.74	125.92	1074.96	1009.40	194.53	38.25		167.30	
OCT	1893.64	1710.53	66.14	155.51	573.01	(900.00)	152.46	80.79	15.75	39.45	
NOV	1349.68	1784.96		277.08	613.66	(1553.83)	102.85	85.40	2.51	36.99	
DEC	2830.87	2740.14		305.38	1175.98	(1800.00)	118.65	110.36	90.54	49.32	40.50
TOTAL	30424.60	16321.27	768.40	1952.50	5344.30	3359.92	1384.55	665.50	108.80	438.36	81.00

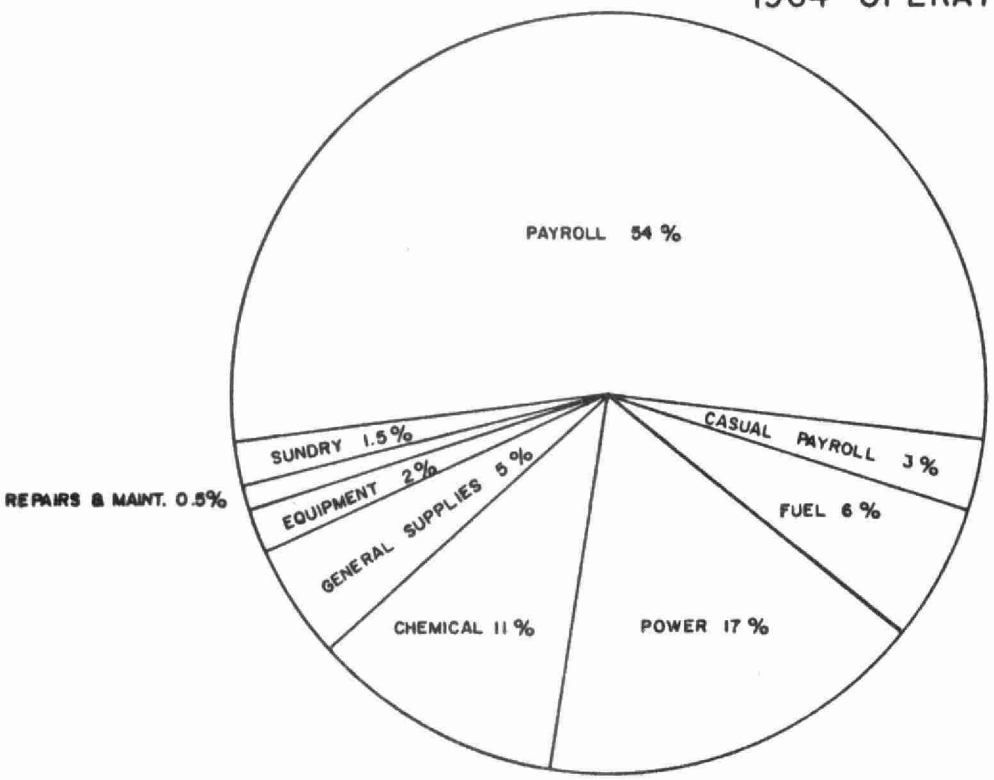
BRACKETS INDICATE CREDIT

YEARLY COSTS

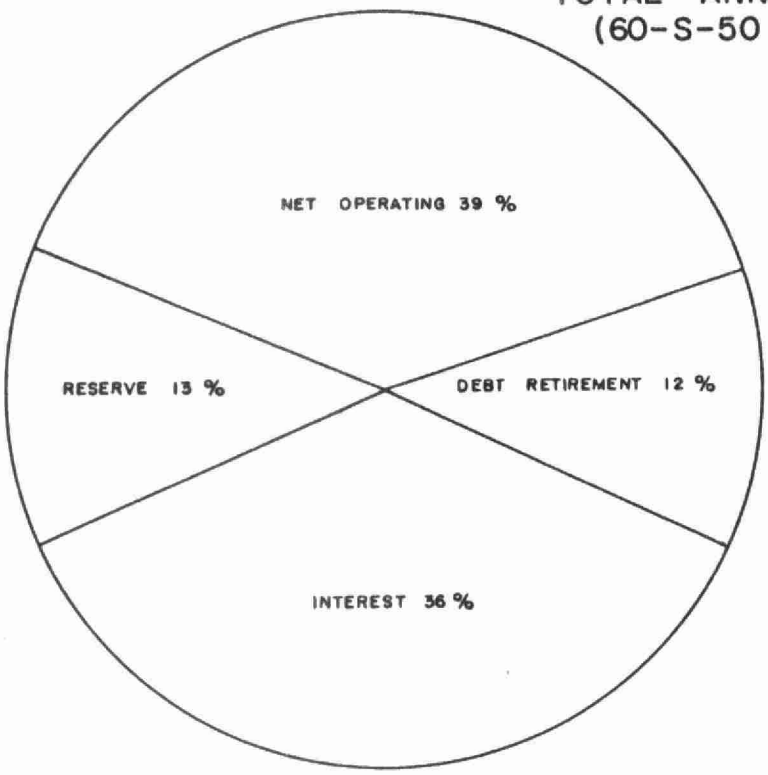
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1964	* 819.84	$30,424.60	$2.54	$37.11	

* PRORATED ON 8 MONTHS' DATA

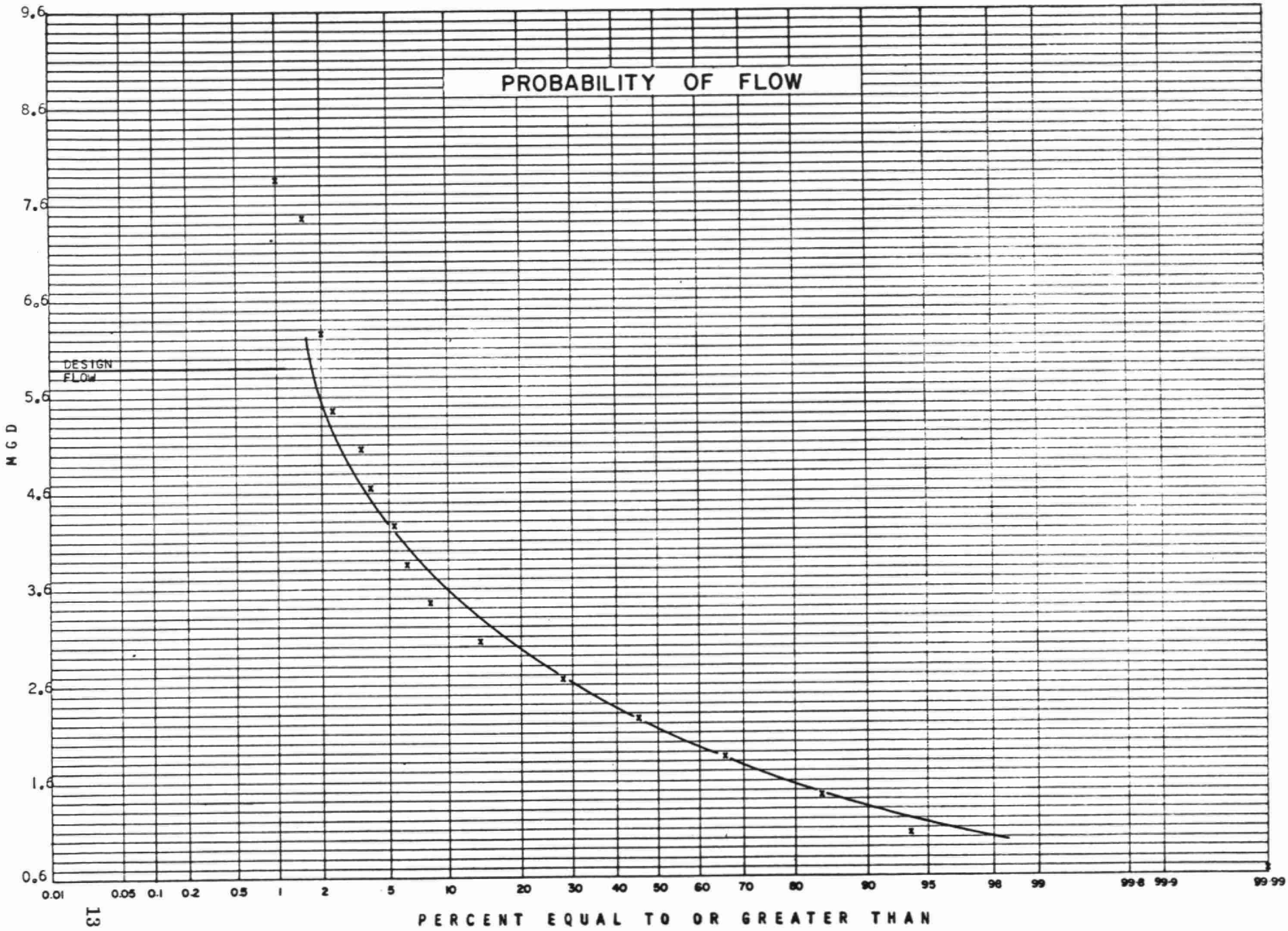
1964 OPERATING COSTS

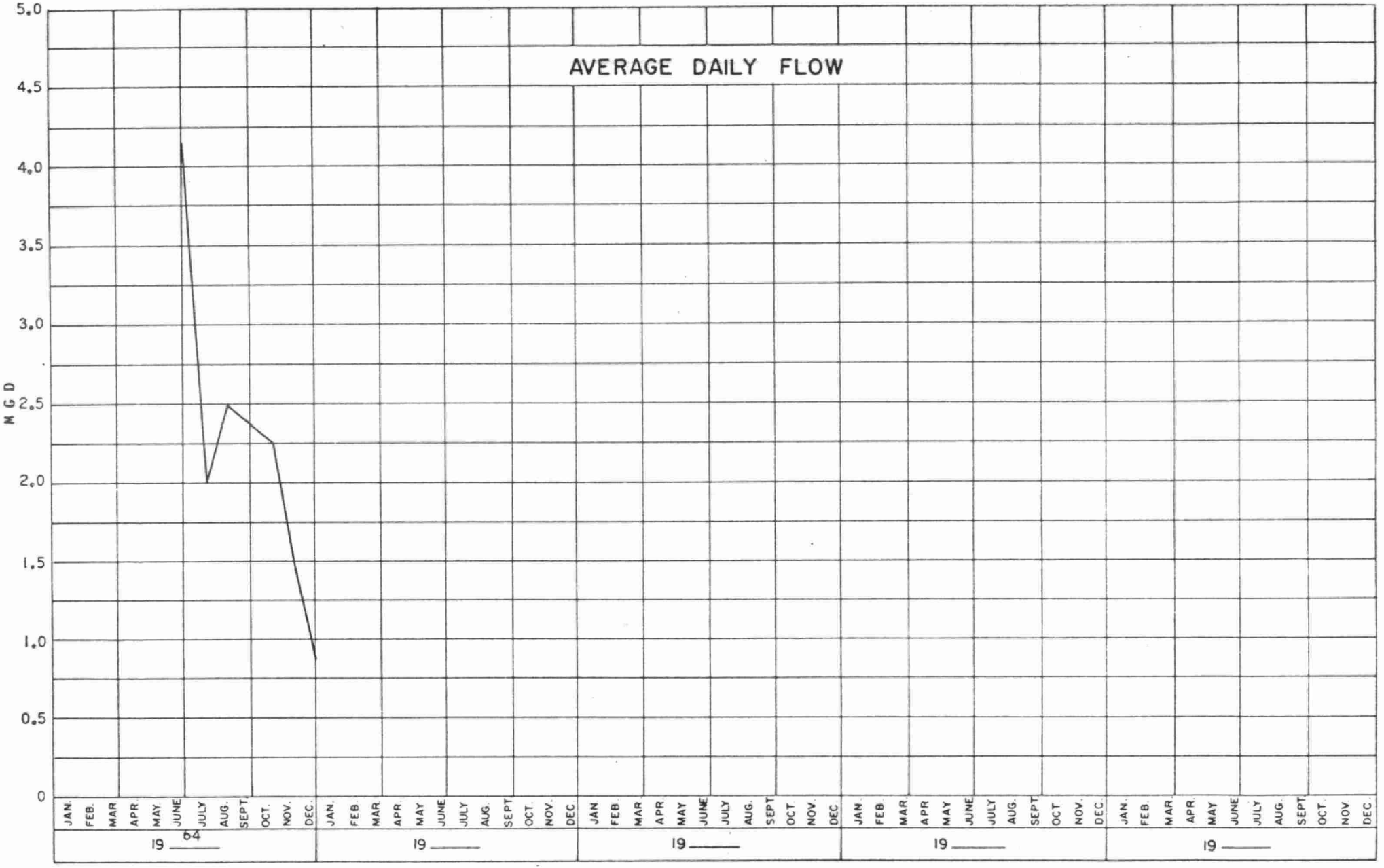


TOTAL ANNUAL COST (60-S-50 ONLY)



Technical Section


PROBABILITY OF FLOW
DESIGN FLOW
MGD
9.6
8.6
7.6
6.6
5.6
4.6
3.6
2.6
1.6
0.6
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PERCENT EQUAL TO OR GREATER THAN


AVERAGE DAILY FLOW
M G D
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 64
19 ____
19 ____
19 ____
19 ____

GRIT REMOVAL IN CU. FT.

July	94.5	October	162.0
August	162.0	November	202.5
September	-	December	-
Total:	621.0	(six months' data)	
Average:	77.6		

COMMENTS

Most data is unavailable because an adequate sampling procedure had not been set up, and grit removal was intermittent.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY			
FEBRUARY			
MARCH			
APRIL			
MAY	** 75.64		
JUNE	** 123.00		
JULY	61.35		
AUGUST	77.08	* 8225	11.88
SEPTEMBER	71.42	8955	12.54
OCTOBER	70.12	10865	15.49
NOVEMBER	44.28	-	-
DECEMBER	27.00	-	-
TOTAL	549.90	28045	-
AVERAGE	68.74	9348	13.28

* 28 days chlorination
** Pro-rated

COMMENTS

Chlorination, for purposes of disinfection, is normally carried on from break-up to freeze-up of the receiving stream. Chlorination is effected by means of one ton cylinders.


ONTARIO WATER RESOURCES COMMISSION